From: "Tim Bodemann" <bodemann@easterninstruments.com>
To: "Jerry Finlinson" <Jerry-F@ipsc.com>
Date: 10/2/2003 12:51:10 PM
Subject: RE: Eastern pluggage warranty and accuracy

Jerry,

To summarize our telephone conference today:

1) We WILL guarantee our flow measurement, as installed within the ABT burner, to be accurate WELL within your requested 3% of the "primaries". The "primaries" being the NIST traceable/certified nozzles within our AMCA/ANSI airflow test stand.

We will do the CFD modeling AND if desired, we will test the full size ABT burner with VAP's installed within our AMCA/ANSI airflow test stand. Included, we will construct a header (chamber) which the burner will fit in, to simulate the windbox. Again, please note, that since we are doing the CFD modeling upfront, we will not have to "play" with any design changes or pitot placement adjustments once we receive the burner, thus the turnaround time will be minimal for our airflow test stand testing, correlation, and verification.

2) We addressed the Pitot pluggage issue during our teleconference. Even in turbulent airflow, the pitot has been designed not to allow particulate into the sensing holes. On the side plate sensing holes, there is "boundary separation" and on the trailing holes the VAP design does not create vortex shedding (eddy currents), thus no pluggage and no buildup on the trailing edge. The design we are working with ABT on minimizes turbulence as the flow exists the perf plate onto the VAP Pitots. The perf plate of which we are assisting ABT in the design (CFD modeling) is a nice means of flow straightening for the VAP's as well as a means to optimize the burners performance as stated by ABT. To back this up, we WILL agree to a withholding of a portion of the project monies until examination during the next outage in a year....this by far is the best way to relay our confidence in the technology/design.

3) I re-iterate item number "3" below about the purging. Summary: the continuous purge (if you would like to utilize that option) provides positive pressure to the dP sensing chambers. Even if there is a 100% offset in the continuous purging from one side to the other (ie., purging flow only into one sensing line of the two), it would affect the dP to the transmitter by no more than a 1 to 2% error. Thus, you shouldn't have to "play" with the continuous purge once installed. Also continuous purge does not place the CFM and PSI demand (CFM cost and maintenance) on your plant air system as required with an automatic "blow back" purge system. I have seen automatic "blow back" purges cause flyash to solidify like cement within pitots due to condensate found within the plant air.....danger, danger.

4)The VAP technology was designed to handle turbulent airflow streams better than other pitot technologies. Please note (contrary to popular belief) that cylindrical pitots as shown in the paper I e-mailed to you this week, do not handle turbulent (pitch and yaw) flows well at all (and this is also referenced by other technical authors as noted within the paper).

5) Our proposal includes (4) VAP pitots per burner at the four equal quadrants. We would be glad to quote (2) per burner as did our competition, BUT we feel (4) are necessary since the airflow rate into all four quadrants may not be completely uniform.

6) We will discuss the installation of "inner barrel" pitots with ABT per Aaron's request. We will provide a price to ABT to include additional inner barrel VAP pitots, continuous purge, and applicable magnahelic gauges. I will have those prices to ABT by Monday.

7) We will work with ABT to provide installation drawings for the dP tubing lines from the burner to the windbox wall; ie., tubing temperature expansion bends, hangers/supports, etc. Stainless steel tubing is provided within our proposal to tie (header) the VAP's together and then forward the dP signal from the VAP pitot header to the bulkhead.

8) We will provide a revised proposal to ABT for a temperature compensated output 4-20mADC signal. We heard that you are not interested in pressure compensating since the windbox pressure is stable (please let us know if that is not the case and if you want pressure compensation too). Per your request, the temperature compensation will require two temperature elements (temperature transmitters) for each windbox, and the DPS-Differential Pressure System transmitters (versus the DPU dP transmitter). Although we did originally give ABT numbers for the DPS as well as for the DPU transmitter, the DPS scope has changed slightly since now each burner does not require its own temperature element (now only two temperature elements per windbox), but we will need to split the temperature signal to the (6) DPS transmitters within each panel. I will have those prices to ABT by Monday.

If you have any further questions, please call me; cell (919) 345-6730. We know that we will work well, together with ABT on this project as we have with them on past projects. We are looking forward to providing an accurate, engineered flow measurement system on the ABT burners for Intermountain Power.

Best Regards,

Tim Bodemann
(910) 392-2490 ext 16

-----Original Message-----
From: Jerry Finlinson [mailto:Jerry-F@ipsc.com]
Sent: Wednesday, October 01, 2003 2:18 PM
To: Tim Bodemann
Subject: RE: Eastern pluggage warranty and accuracy

Tim,
It sounds like you are willing to guarantee the accuracy to within 3%,
but that you are not committed to do the wind tunnel testing. Can you commit
to not only the CFD modeling and but doing the wind tunnel testing in

the 10 ft x 10 ft x 10 ft minimum size chamber with the air blowing in the side?

We are also still nervous about the pluggage issue, especially in this highly turbulent burner inlet. You have stated that you are confident that we'll be OK and should only need to do a manual purge once a year on the outage.
What kind of guarantee can you give us for pluggage. Are you willing to back it up with a performance bond or let us withhold 20% of the price for one year and we'll examine them at the next outage to determine the pluggage?
What can you do to reduce our risk?

A separate item is that our performance guy, Aaron, sees great value in knowing the inner air flow separately from the overall air flow. Could you give us a ballpark estimate for putting 2 or 3 short 4 inch probes into the inner air zone only and pipling that out to a gauge?
We'd like to be able to have a continuous purge on that, which we could disable.
That would be on all 48 burners.

What is the ballpark cost difference of the DPU and DPS transmitter?

Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

>>> "Tim Bodemann" <bodemann@easterninstruments.com> 9/30/2003 10:35:57 PM >>>
Jerry,

Yes, I too think we got alot accomplished during our phone call today. As for the salesmanship.....well.....I just think I know our product and capabilities real well.....the tough part is to try to convey that message (capabilities) as accurately and concise as possible....so with that said, I thank you for your complement!

Our Technical Director, our Engineering Manager, and I look forward to our conference call with you and your people on Thursday at 9:00am

Mountain Time.

To answer your questions (and we will re-address these questions during
the conference call):

1) Our spec sheet states 700F and this number is conservative. We provide pitots that span 20' duct cross-sections, with a safety factor
of 4 on tensile strength at that temperature. For your application we will be installing 16" VAP Pitots, capable of withstanding 900+F with a
safety factor of 2 on tensile strength.

2) Our VAP Pitots are repeatable and as stated during our telephone
conversation today, we will guarantee accuracy to match within 1 to 1 *
% of the "primaries" (the NIST traceable nozzles) within our AMCA/ANSI
airflow test stand. CFD Modeling is a necessity on this project. AMCA/ANSI airflow test stand (wind tunnel) testing of the burner will be
provided if desired.

3) Purging. Our continuous purge (if you would like to utilize that
option that we will provide within our system at your request), provides
positive pressure within the dP sensing chambers. The flow rate of continuous purge is so low that it does not affect our biasing. Even if
the balance in the purge was skewed 100%, it would only affect our dP by
less than 1 to 2% (1 to 2% error in a worst case scenario). I would like our Technical Director to re-emphasize during our conference call the technology behind our "non-plugging VAP/PA Pitot design and why it
has been successfully installed in heavy particulate applications.

4) Yes, we can provide what you want within a pressure/temperature (density) compensated transmitter (our DPS). We have quoted this option
to ABT...we will discuss this with ABT so they can forward onto you (if not already) the cost associated with this option.

Please see the attached example of our engineered solution to measuring
airflow within a short duct run. This is the Midwest Gen Homer City project where we are replacing a rec
ently installed competitor's
$250K
primary flow measurement system, which never worked from the first day.
Like your burner, this duct work had no straight duct run. Again, we take an approach not to just stick pitots into a duct and assume that it
will react similar to another duct configuration...hence the need for the
CFD modeling as good engineering practice upfront...prior to cutting metal. Please contact Russ Wingard from Homer City at 724-479-6265. Though we have shipped the solution and they will be installing the equipment in November, Russ/Homer City is very excited about our technology and approach to there measurement issue. We are looking forward to writing a white paper on the project and presenting it during
the next Power Gen.

Also attached is a reference paper on the "Analysis of a Cylindrical Pitot". This helped explain for me on why the fechheimer pitot works sometimes and why it doesn't work other times. A must for reading!

Again, thank you for your time and we look forward to our teleconference
and a successful installation.

Best Regard,

Tim

-----Original Message-----
From: Jerry Finlinson
Sent: Tue 9/30/2003 7:30 PM
To: Tim Bodemann
Cc: Jim Knapp
Subject: IPSC questions

Tim,
I was good to visit with you today, you are a good salesman.

We still have some concerns that you need to convince us of.

1. Can the aluminum material handle the temperature. Your spec sheet says 700F.
What kind of warranty or remedy if it fails?

2. What is your guaranteed accuracy? Can you guarantee 3% installed and how to verify that?
We'd like to see you do CFD and wind tunnel testing of a mockup windbox, similar to what Air Monitor has done.

3. Purging - we don't really like continuous purge, we've had trouble with ours in the past. How is your's better, if not necessary why have it? Explain why particles don't impinge in holes and cause eventual plugging. Several guys have problems with this claim.

4. We'd like to see the DPS transmitter with temperature and pressure correction. You could have one thermocouple on each end of the windbox and use it for 3 transmitters. So that would be 16 thermocouples all together. Does your baseline price include that? If not then have ABT include the full complement on the baseline price.

Thanks, Jerry

Jerry Finlinson, Engineer
Intermountain Power Service Corp
850 West Brush Wellman Rd
Delta, UT 84624
435-864-6466 fax 0776/6670
jerry-f@ipsc.com

CC: "Jim Knapp" <JIM-KNAPP@ipsc.com>, <joel@advancedburner.com>, <sal@advancedburner.com>, <JIM-N@ipsc.com>, <Phil-H@ipsc.com>, <AARON-N@ipsc.com>, <BILL-M@ipsc.com>, <Garry-C@ipsc.com>, "James Seagraves" <seagraves@easterninstruments.com>, "Robert Brandt" <rbrandt@easterninstruments.com>